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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID PAUL AGNELLO, MARY CONROY BUSHEY,
DONNA K. JOHNSON, JEROME BRETT LASKY, PETER JAMES
LINDGREN, and KIRK DAVID PETERSON

Appeal 2007-3404
Application 09/939,895
Technology Center 2800

Decided: February 29, 2008

Before JOSEPH F. RUGGIERO, ROBERT E. NAPPI, and KARL D.
EASTHOM, *Administrative Patent Judges*.

EASTHOM, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the Final Rejection of claims 27, and 33-44. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

Appellants' claimed invention relates to a silicon structure with a cobalt disilicide layer, the layer in contact with a reagent comprising water, ammonium hydroxide, and hydrogen peroxide. The reagent is employed to remove an undesired stringer of titanium oxide. (Spec. 9, 14).

Claim 27 is illustrative of the invention and reads as follows:

27. A structure, comprising a layer of cobalt disilicide and a layer of silicon, wherein the layer of cobalt disilicide is on the layer of silicon, wherein the layer of cobalt disilicide is substantially free of cobalt monosilicide, wherein there is essentially no stringer of an oxide of titanium on the layer of cobalt disilicide, and wherein the layer of cobalt disilicide is in contact with a reagent comprising water, ammonium hydroxide, and hydrogen peroxide.

The Examiner relies on the following prior art reference to show unpatentability:

Raaijmakers US 4,908,331 Mar. 13, 1990

Claims 27, 33-34, and 39-44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Raaijmakers.

Claims 27, 33-34, and 39-44 stand rejected under 35 U.S.C. § 103 (a) as being obvious over Raaijmakers.

ISSUE

Under 35 U.S.C § 102(b), or alternatively under 35 U.S.C. § 103 (a), does Raaijmakers respectively disclose or render obvious the invention set forth in claims 27, 33-34, and 39-44?

PRINCIPLES OF LAW ANTICIPATION

It is axiomatic that anticipation of a claim under § 102 can be found if the prior art reference discloses every element of the claim. *See In re King*, 801 F.2d 1324, 1326 (Fed. Cir. 1986) and *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458 (Fed. Cir. 1984).

In rejecting claims under 35 U.S.C. § 102, “[a] single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation.” *Perricone v. Medicis Pharmaceutical Corp.*, 432 F.3d 1368, 1375 (Fed. Cir. 2005), citing *Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 1565 (Fed. Cir. 1992). Anticipation of a patent claim requires a finding that the claim at issue “reads on” a prior art reference. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1346 (Fed Cir. 1999) (“In other words, if

granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether it also covers subject matter not in the prior art.”) (internal citations omitted).

OBVIOUSNESS

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). “[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). Furthermore, “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness’ . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007)(quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

ANALYSIS

With respect to the 35 U.S.C. § 102(b) rejection of independent claim 27 based on the teachings of Raaijmakers, the Examiner indicates how most of the various limitations read on the disclosure of Raaijmakers. (Ans. 3-4). On the other hand, with respect to the claim limitation wherein “the layer of cobalt disilicide is in contact with a reagent comprising water, ammonium hydroxide, and hydrogen peroxide,” the Examiner determined that the limitation is not a structural limitation, but a product-by-process limitation. (Ans. 4, Office Action (mailed June 04, 2003, pp. 2-3)). The Examiner further determined that the product-by-process limitation was not required to be disclosed by Raaijmakers in order to maintain the rejection because “[t]he patentability of a product does not depend on its method of production.” (Ans. 6) (citing and quoting *In re Thorpe*, 777 F.2d 695, 698 (Fed. Cir. 1985)).

In response to the Examiner’s determination, Appellants’ asserted that the limitation “contact with a reagent” recites structure (Br. 6, Reply Br. 4). Our interpretation of Appellants’ claim and disclosure coincides with that of Appellants, i.e., Appellants’ claim specifically requires that “the layer of cobalt disilicide *is in contact* with a reagent.”

The Examiner explains his position as follows:

This argument [of Appellants] is not convincing because at the final structure, as shown in Figures 10 and 18 of the present invention, there is no reagent in contact with the cobalt disilicide. Therefore, the limitation of “the layer of cobalt disilicide is in contact with a reagent”

is really recited in the intermediate step of forming the cobalt disilicide. As the result, the term “the layer of cobalt disilicide is in contact with a reagent comprising water, ammonium hydroxide, and hydrogen peroxide” is method recitation in a device claimed.

(Ans. 6).

Hence, as we understand the Examiner’s position, the determination that the reagent limitation is a process limitation is based on the finding that Figures 10 and 18 of the Specification respectively represent final products required to support respectively, Appellants’ claims 27 and 34, but Figures 10 and 18 do not disclose a reagent.¹ To counter the Examiner’s position, Appellants argue that the Specification provides support for the claims which are drawn to the structure of an intermediate product in contact with the claimed reagent (Reply Br. 4-5) (citing Spec. 9: 12-18).²

Appellants’ Specification states:

Although the second annealing step forms the desired layer of cobalt disilicide **44**, an undesired stringer of an oxide of titanium **42** may be nonetheless be present on the layer of cobalt disilicide **44** following completion of the second annealing step, as shown in FIG. 9.

FIG. 10 depicts FIG. 9 following a third cleaning step, which has the purpose of removing the stringer of an oxide of titanium (see Fig. 9) in order to prevent shorting of adjacent electrical structures

¹ Figures 10 and 18 respectively provide partial support for independent claims 27 and 34. Claims 27 and 34 involve similar disputed claim limitations at issue.

² We also find further support for claim 34 at the Specification page 14, lines 3-16.

within, or coupled to, the substrate **20**. The third cleaning step removes the stringer **42** by applying a reagent under suitable conditions; e.g., by immersing the substrate **20** in a chemical reagent at a suitable temperature and period of time, wherein the reagent does not chemically react with the layer of cobalt disilicide **42** [sic 44].

(Spec. 9: 6-15) (emphasis original).

We find that the import of the passage above is that a product having a cobalt disilicide layer 44 formed on a layer of silicon 33 as represented by Figure 9 is immersed in, and in contact with, a reagent until an undesired stringer 42 of titanium oxide is removed. A product not having the stringer 42 is depicted in Figure 10.

Turning back to the Examiner's position, we infer it to be that because contact with a reagent occurs sometime after the Figure 9 product (depicting a titanium oxide stringer 42) is formed but prior to the time the Figure 10 product (depicting no titanium oxide stringer) is formed, and since the claim requires a structure with essentially no titanium oxide stringer to be in contact with the claimed reagent, neither Figure 9 nor Figure 10 supports the claim as a final product. In other words, based on the lack of support for a structure having essentially no titanium oxide stringer on a cobalt disilicide layer in "contact with a reagent," the Examiner interpreted "contact with a reagent" as a product-by-process limitation (i.e., the process occurring before the final product is formed).³

³ The Examiner also reasons that "the limitation of reagent is really recited in the intermediate step of forming the cobalt disilicide." (Ans. 5, *see also*

We determine that the Examiner's interpretation, while not unreasonable,⁴ improperly narrows the broad import of the Specification to alter the plain meaning of the claim language. That is, we find the import of the Specification to be that a product as represented by Figure 9 can be immersed in and in contact with the disclosed and claimed reagent until the titanium oxide stringer essentially or totally disappears.⁵ A stringer free structure is represented by Figure 10 according to the passage above. We also find that the Specification supports immersed products ranging from those having undesired amounts of titanium oxide stringers to those having no or essentially no stringers such as the Figure 10 product.⁶

passage quoted *supra* 5 (quoting Ans. 6)). However, the Specification reveals that the cobalt disilicide layer is formed in the second annealing step prior to the third reagent cleaning step (*see* passage quoted *supra* 6 (quoting Spec. 9: 6-15)). So while the Examiner is correct that there are reagent cleaning steps prior to the cobalt disilicide formation (*see eg.* Spec. 8), the third cleaning step at issue occurs after the final formation of the cobalt disilicide.

⁴ The Examiner's Answer did not have the benefit of Appellants' argument raised first in their Reply Brief that the claimed product represents an intermediate product. We do not base our decision on the distinction between intermediate and final products, but we consider the distinction a helpful aid (initially unavailable to the Examiner) clarifying Appellants' position.

⁵ There is no requirement under 35 USC § 112 that claim limitations be depicted.

⁶ In resolving the appeal, we do not find it necessary to distinguish whether the products that are immersed or not immersed in the reagent are intermediate or final products. We are cognizant of Appellants' statement that "claims 27 and 34 do not recite the final structure shown in Fig. 10" (Reply. Br. 4). Appellants' statement could be interpreted to mean that

That is, the disclosure does not imply, as the Examiner's position suggests: that a product as depicted in Figure 9 is removed from contact with the reagent, and then, afterwards, the undesired stringer disappears or essentially disappears. Rather, we find the plain import of the disclosure to be that a product as represented by Figure 9 is immersed in the reagent *until it* becomes a product like that depicted in Figure 10 having no or essentially no titanium oxide stringer, and then the product is removed from contact with the reagent. (Moreover, a product may still be "wet" and hence in "contact" with the reagent.) We consequently determine that the element: "wherein the layer of cobalt disilicide is in contact with a reagent comprising water, ammonium hydroxide, and hydrogen peroxide" constitutes structure in accordance with the import of the Specification as described.

Accordingly, because the Examiner has determined that the claim limitation "in contact with a reagent comprising water, ammonium hydroxide, and hydrogen peroxide" is not present in the disclosure of Raaijmakers (*see Ans. 4*), and we concur with the Examiner as to that determination, we will not sustain the Examiner's 35 U.S.C § 102(b) rejection of claim 27.

While not necessary to resolve the appeal, to clarify the record, we turn to Appellants' argument that Raaijmakers does not disclose the

claims 27 and 34 do not recite final products for two separate reasons: i.e., 1) Fig. 10 does not depict a stringer of titanium oxide, and 2) Fig. 10 does not depict contact with a reagent.

limitation of “essentially no stringer of an oxide of titanium on the layer of cobalt disilicide” (Br. 7). In short, we do not find the argument persuasive. We adopt the Examiner’s finding that Raaijmakers discloses no titanium oxide (Ans. 7). In support of the Examiner’s finding, we note that Appellants disclose and argue that a titanium oxide stringer is formed as a “residual” (i.e., undesired) by-product of a process of employing a titanium nitride (TiN) capping layer (Reply Br. 6; Spec. 1-2). Since we find that Raaijmakers does not disclose or suggest such a process (or any process involving titanium), we determine that “there is essentially no stringer of an oxide of titanium on the layer of cobalt disilicide” in Raaijmakers’ product as claimed. To adopt Appellants’ position would require us to find that Raaijmakers inherently discloses titanium oxide. In the absence of persuasive evidence advanced by Appellants to support such a finding, we decline to adopt Appellants’ position.⁷

⁷ Appellants argue that the Examiner must prove that Raaijmakers does not inherently (i.e., necessarily) disclose the absence of titanium oxide (Reply Br. 5-6). We determine that the finding that no titanium is employed in Raaijmakers’ product or process means that there is necessarily no oxide of titanium, and the finding has not been rebutted by persuasive evidence that titanium is employed. In other words, where as here, the evidence shows that Appellants and Raaijmakers disclose *different* processes, we determine that the burden shifts to Appellants to put forth evidence that the different processes inherently create the *same* by-product (i.e., titanium oxide). Cf. *In re Best*, 562 F.2d 1252 (CCPA 1977) (burden shifts to applicant to prove lack of a (i.e. a *different*) recited functional limitation if evidence shows products or processes are the *same or similar*); see also *In re King*, 801 F.2d 1324 (Fed. Cir. 1986); *In re Lutdko*, 441 F.2d 660 (CCPA 1971); *In re Swinehart*, 439 F.2d 210 (CCPA 1971).

In view of the above discussion, since all of the claim limitations are not present in the disclosure of Raaijmakers, we will not sustain the Examiner’s 35 U.S.C. § 102(b) rejection of independent claim 27. Since claims 27 and 34 recite a similar limitation involving the same issue in dispute, we also will not sustain the Examiner’s 35 U.S.C. § 102(b) rejection of claim 34. Since claims 33 and 39 to 44 ultimately depend from either claim 27 or 34, we also will not sustain the Examiner’s 35 U.S.C. § 102(b) rejection of those claims.

35 U.S.C. § 103(a) REJECTION

We also will not sustain the Examiner’s obviousness rejection of claims 27, 33-34 and 39-44 based on the teaching of Raaijmakers. The Examiner states that the claims are “rejected... in the alternative, under 35 USC 103(a) as obvious over Raaijmakers” (Ans. 3), but we find no statement or evidence beyond a conclusion in the Examiner’s Answer to support the obviousness rejection. It is not clear which claim element the Examiner asserts to be obvious.⁸ Nonetheless, we also find that Raaijmakers does not disclose or suggest the claimed reagent “comprising water, ammonium hydroxide, and hydrogen peroxide.” Hence, the Examiner has not met the initial burden of clearly articulating the factual foundation on which to support the legal conclusion of obviousness. *See KSR Int’l Co. v. Teleflex Inc.* at 1741 (quoting *In re Kahn*, 441 F.3d at 988); *In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988).

⁸ It appears that the Examiner’s reference to the 103 rejection may have been an inadvertent misprint.

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CONCLUSION

In summary, we will not sustain the Examiner's rejections of the claims on appeal. Therefore, the decision of the Examiner rejecting claims 27, 33-34 and 39-44 is reversed.

REVERSED

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